CLAIMS

What is claimed is:

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- a) a transmit block coupled to transmit discrete multitone
- 3 modulated upstream data to a subscriber line;
- b) a hybrid network coupled to the subscriber line and the transmit
- 5 block; and
- 6 c) a receive block coupled to the hybrid for receiving discrete
- 7 multitone modulated downstream data from the subscriber line, wherein the
- 8 transmit block, hybrid network, and receive block reside within a same
- 9 integrated circuit package.
- 1 2. The apparatus of claim 1 wherein the hybrid is a first order hybrid
- 2 network.
- 1 3. The apparatus of claim 1 wherein the hybrid is tunable.
- 1 4. The apparatus of claim 1 wherein the hybrid is DC isolated from the
- 2 transmit and receive blocks of the analog front end.
- 1 5. The apparatus of claim 1 wherein the transmit block further comprises:
- 2 i) a first interpolator coupled to interpolate the upstream data from
- 3 a first clock rate to a second clock rate greater than the first clock rate;

- 4 ii) a power spectral density shaping filter coupled to shape the 5 power spectrum of the interpolated upstream data; and
- 6 iii) a second interpolator coupled to interpolate the shaped signal to 7 a third clock rate greater than the second clock rate.
- 1 6. The apparatus of claim 1 wherein the transmit block, hybrid network,
- 2 and receive block are fabricated on a same integrated substrate to form a
- 3 complementary metal oxide semiconductor (CMOS) integrated circuit.
- 1 7. A method comprising the steps of:
- a) receiving a discrete multitone modulated upstream data signal
- 3 at a first clock rate, c1;
- b) interpolating the upstream signal to a second clock rate c2 > c1.
- 5 c) processing the interpolated signal through a power shaping
- 6 power spectral density shaping filter;
- 7 d) interpolating the power shaped signal to a third clock rate c3 > c2;
- 8 and
- e) converting the twice interpolated signal to an analog signal.
- 1 8. The method of claim 7 further comprising the step of pre-processing
- 2 the received upstream data signal to substantially eliminate even images.
- 1 9. The method of claim 5 wherein $c^2 = 1.104$ MHz.
- 1 10. The method of claim 5 wherein c3 = 35.328 MHz.

- 1 11. A method comprising the steps of:
- 2 a) passing a composite signal containing discrete multitone
- 3 modulated upstream and downstream data signals through a hybrid to extract
- 4 the downstream data signal;
- 5 b) filtering the composite signal through a high pass filter having a
- 6 corner frequency, f1;
- 7 c) filtering the high pass filtered signal through a low pass filter
- 8 having a corner frequency f2 > f1; and
- 9 d) converting the twice filtered downstream data signal to a digital
- 10 signal.
- 1 12. The method of claim 11 further comprising the steps of:
- e) decimating the digital signal from a first rate c1 to a second rate
- 3 *c*2, wherein *c*2<*c*1;
- f) filtering the decimated signal with an anti-aliasing low pass
- 5 filter;
- 6 g) decimating the anti-aliased signal to a third rate c3; and
- 7 h) filtering the twice decimated signal with second high pass filter.
- 1 13. The method of claim 12 wherein c2 = 8.836 MHz.
- 1 14. The method of claim 12 wherein c3 = 2.208 MHz.